UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/874,167	06/04/2001	Markus P.J. Fromherz	D/A1215	7647

7590 04/26/2004

Patent Documentation Center
Xerox Corporation
Xerox Square 20th Floor
100 Clinton Ave. S
Rochester, NY 14644

EXAMINER	
HIRL, JOSEPH P	
ART UNIT	**PAPER NUMBER**
2121	5

DATE MAILED: 04/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Applicati n No.	Applicant(s)
	09/874,167	FROMHERZ ET AL.
	Examiner	**Art Unit**
	Joseph P. Hirl	2121

-- The MAILING DATE of this c mmunication app ars on the cover sheet with th correspondenc address --

P ri d f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Pri rity under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Pap r No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to an AMENDMENT entered March 9, 2004 for the patent application 09/874,167 filed on June 4, 2001.

2. The First Office Action of December 11, 2003 is fully incorporated into this Final Office Action by reference.

3. The claims and only the claims form the metes and bounds of the invention. "Office personnel are to give the claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris,* 127 F.3d 1048, 1054-55, 44USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *In re Prater*, 415 F.2d, 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, l 45-48; p 2100-9, c 1, l 1-4). The Examiner has full latitude to interpret each claim in the broadest reasonable sense. Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.

4. Examiner's Opinion:

Para 3 above applies. The claims and only the claims form the metes and bounds of the invention. The Examiner has full latitude to interpret each claim in the broadest reasonable sense. A Markush claim is anticipated if at least one of the plurality of alternatives is anticipated by prior art (MPEP 803.02).

Status of Claims

5. Claims 1, 9, 21, 33, 34 and 42 are amended. Claims 1-42 are pending.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

7. The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

8. Claims rejected under 35 U.S.C. 102(e) as being anticipated by Black (USP 6,269,351, referred to as **Black**).

Claims 1., 33., 34.

Black anticipates receiving a problem statement from the applications module (**Black**, c 1, l 22-23; Fig. 3; Examiner's Note (EN): para 2 above applies; applications

module is a neural network); configuring the solving module with configuration parameters (**Black**, c 1, l 27-30; EN: para 2 above applies; configuration parameters are weights); determining an expected solver behavior associated with said configuration parameters for said problem statement (**Black**, c 1, l 27-30; EN: para 2 above applies; output related to input); determining actual solver behavior (**Black**, c 1, l 27-30; EN: para 2 above applies; output related to input); reviewing, said actual solver behavior to determine if a problem solution has been found (**Black**, c 3, l 18-22); determining whether to perform a solver iteration step or to request the complexity module to performing an adaptation step if a problem solution has not been found, wherein the complexity module captures previous data on said expected solver behavior as a function of said problem configuration parameters and performs at least one of performing a solver iteration step, altering said problem definition changing the optimization algorithm, or requesting additional system resources based on the complexity module's knowledge of optimization behavior; (**Black**, c 3, l 42-50; EN: similar to the applicant, Black's application module is a neural network that has complexity features where the determination is made); performing a said solver iteration step when said solver iteration step is selected, comprising the steps of determining new actual solver behavior and determining whether to repeat said solver iteration step (**Black**, c 3, l 42-50); repeating said solver iteration step until said adaptation step is selected (**Black**, c 3, l 42-50); comparing said actual solver behavior with said expected solver behavior when said adaptation step is selected (**Black**, c 3, l 18-22); requesting the complexity module to perform said adaptation step (**Black**, c 3, l 18-22); performing

said adaptation step, compromising the steps of modifying said configuration parameters within the complexity module, configuring the solving module with said modified configuration parameters, determining expected solver behavior associated with said modified configuration parameters for said problem statement, selecting an algorithm to calculate a revised problem solution, determining a revised actual solver behavior associated with said modified configuration parameters for said problem statement, reviewing said revised actual solver behavior to determine if a problem solution has been found, determining whether to performing said solver iteration step or to request the complexity module to perform another adaptation step if a problem solution has not been found, and repeating said iteration step until said adaptation step is selected (**Black**, c 3, l 13-50); repeating said adaptation step until a problem solution is found (**Black**, c 3, l 13-40); and providing the solution to the applications module (**Black**, Fig. 3; EN: output layer).

Claim 2.

Black anticipates the step of selecting an algorithm to calculate an initial problem solution (**Black**, c 2, l 52-55).

Claim 3.

Black anticipates the step of refining said configuration parameters (**Black**, c 3, l 42-43).

Claims 4., 10., 22., 35.

Black anticipates the problem solver comprises an adaptive constraint problem solver (**Black**, c 3, l 42-43; EN: adapting to the new pattern).

Claims 5., 12.

Black anticipates the step of transforming said problem statement after receiving said problem statement from the applications module (**Black**, c 1, l 26-34; EN: transformation is achieved from input to output).

Claims 6., 13., 25.

Black anticipates the step of transforming said problem solution before providing said problem solution to the applications module (**Black**, c 1, l 26-34; EN: transformation is achieved from input to output).

Claims 7., 14., 26., 39.

Black anticipates configuration parameters include problem configuration parameters and solver configuration parameters (**Black**, Fig. 3, c 1, l 26-34; EN: in a neural network with multiple input layers, the weights of one layer would be problem configured while the weights of another layer would be solver configured).

Claims 8., 15., 27.

Black anticipates the step of transforming said problem configuration parameters before providing said problem configuration parameters to the solving module (**Black**, Fig. 3, c 1, l 26-34; EN: in a neural network with multiple input layers, the weights of one layer would be problem configured while the weights of another layer would be solver configured).

Claim 9.

Black anticipates an input device for providing the problem statement (**Black**, c 1, l 17-25; c 23, l 29-33; EN: neural networks are typically implemented on standard

computers wherein an input device is generic); a computer coupled to the output of said input device (**Black**, c 1, l 17-25; c 23, l 29-33; EN: a computer is a multi-functional device with various components coupled to inputs); a memory portion coupled to said computer comprising (**Black**, c 1, l 17-25; c 23, l 29-33; EN: a computer is a multi-functional device with various components); software for receiving the problem statement from said input device (**Black**, c 1, l 17-25; c 23, l 29-33; EN: a computer is a multi-functional device with various components); software for identifying system configuration parameters and system secondary goals (**Black**, c 1, l 27-34; EN: weights are configuration parameters and system secondary goals are represented in the software implementation of the neural network); software for configuring a problem solver (**Black**, c 1, l 27-34; EN: typical software implementation); software for determining expected solver behavior (**Black**, c 1, l 27-34; EN: typical software implementation); software for determining actual solver behavior and determining whether a solution has been found (**Black**, c 1, l 27-34; Equation(4); EN: typical software implementation); software for determining whether to perform a solver iteration step or to perform an adaptation step, software for determining whether to perform a solver iteration step or to perform an adaptation step, comprising capturing previous data on said expected solver behavior as a function of said problem configuration parameters and performing at least one of performing said solver iteration step, altering said problem definition, changing the optimization algorithm, or requesting additional system resources based on knowledge of optimization behavior(**Black**, c 1, l 27-34;Equation(4); EN: typical software implementation; input/output data is available for

training; each training step is an iteration; optimization of weights is changed by feedback; additional system resources to achieve optimization is represented by increasing weights); and software for performing an adaptation step, comprising modifying said configuration parameters and reconfiguring said problem solver (**Black**, c 3, l 13-40; EN: typical software implementation); and output means for providing a solution statement (**Black**, Fig. 3; EN: output layer).

Claim 11.

Black anticipates said memory portion further comprises software including a learning module for refining said expected solver behavior (**Black**, c 1, l 26-34; EN: memory is generic with computers holding applicable software/data).

Claim 16.

Black anticipates software for determining expected solver behavior comprises a data structure containing configuration parameters and expected structure, said behaviors for a plurality of problem types (**Black**, c 1, l 26-34; c 23, l 29-33; EN: neural network structure will be inherent in the software implementation containing weights).

Claims 17., 29.

Black anticipates said control computer comprises an embedded computer (**Black**, c 23, l 16-33; EN: the "embedded computer" as described in the specification at page 13, lines 1-3 and further illustrated in Fig. 1 of the disclosure is a generic computer and hence, to one of ordinary skill in the art, the related implementation of ANN described by Black applies).

Claims 18., 30.

Black anticipates embedded computer system controls at least one operation within a copier or printer (**Black**, c 23, l 16-33; EN: see claim 17 comments; operation of a printer is a process).

Claims 19., 31.

Black anticipates embedded computer system controls at least one operation within a process control system (**Black**, c 23, l 16-33; EN: see claim 17 comments).

Claims 20., 32

Black anticipates embedded computer system controls at least one operation within a diagnostics unit (**Black**, c 23, l 16-33; EN: see claim 17 comments).

Claim 21.

Black anticipates an input device for providing the primary goal for the task to be performed (**Black**, c 1, l 16-33); a computer coupled to the output of said input device (**Black**, c 1, l 17-25; c 23, l 29-33; EN: a computer is a multi-functional device with various components coupled to inputs); a memory portion coupled to said computer comprising (**Black**, c 1, l 17-25; c 23, l 29-33; EN: a computer is a multi-functional device with various components): a controllable solving module for calculating actual solver behavior (**Black**, c 1, l 27-34; EN: typical software implementation; solving module/software controls the output); a complexity module coupled to said controllable solving module, for configuring a problem statement, wherein the complexity module captures previous data on said expected solver behavior as a function of said problem configuration parameters and performs at least one of performing a solver iteration step, altering said problem definition changing the optimization algorithm, or requesting

additional system resources based on the complexity module's knowledge of optimization behavior (**Black**, c 3, l 42-50; EN: similar to the applicant, Black's application module is a neural network that has complexity features; coupling is accomplished by software); and a comparison module for comparing said actual solver behavior with expected solver behavior (**Black**, c 2, l 49-58; EN: to set the weights); and output means for providing a solution statement (**Black**, Fig. 3; EN: output layer).

Claim 23.

Black anticipates a learning module for refining said expected solver behavior (**Black**, c 1, l 27-34).

Claim 24.

Black anticipates a problem transformer module for transforming said problem solution before providing said problem solution to said output means (**Black**, c 1, l 27-34; EN: software that implements the neural network process will appropriately transforms the problem solution).

Claim 28.

Black anticipates complexity module a data structure, said data structure containing configuration parameters and expected behaviors for a plurality of problem types (**Black**, c 1, l 27-34).

Claim 36.

Black anticipates the step of referring the control parameters (**Black**, c 1, l 27-34).

Claim 37.

Black anticipates the step of transforming said problem statement (**Black**, c 1, l 27-34; EN: implemented software is by nature a transforming process).

Claim 38.

Black anticipates the step of transforming said problem solution (**Black**, c 1, l 27-34; EN: implemented software is by nature a transforming process).

Claim 40.

Black anticipates the step of transforming said problem configuration parameters (**Black**, c 1, l 27-34; ; EN: implemented software is by nature a transforming process).

Claim 41.

Black anticipates the step of selecting an algorithm for calculating a problem solution (**Black**, c 1, l 27-34).

Claim 42.

Black anticipates a first plurality of binary values for receiving a problem statement transmission and storing the problem statement in a first data format (**Black**, c 1, l 17-25; Fig. 3; c 23, l 16-33; EN: para 2 above applies; to one of ordinary skill in the art, neural networks are implemented on computers that have binary systems); a second plurality of binary values for transforming the first data format to a second data format (**Black**, c 1, l 17-25; Fig. 3; EN: software implementation is synonymous with transformation); a third plurality of binary values for determining expected solver behavior associated with said second data format (**Black**, c 1, l 17-25; Fig. 3); a fourth plurality of binary values for determining actual solver behavior associated with said

second data format (**Black**, c 1, l 17-25; Fig. 3); a fifth plurality of binary values for determining if a problem solution has been found (**Black**, c 3, l 13-22) ; a sixth plurality of binary values for determining whether to perform a solver iteration step or perform an adaptation step if a problem solution has not been found, wherein the complexity module captures previous data on said expected solver behavior as a function of said problem configuration parameters and performs at least one of performing a solver iteration step, altering said problem definition changing the optimization algorithm, or requesting additional system resources based on the complexity module's knowledge of optimization behavior; (**Black**, c 1, l 17-25; Fig. 3; c 3, l 42-50; EN: similar to the applicant, Black's application module is a neural network that has complexity features where the determination is made); a seventh plurality of binary values for comparing said expected solver behavior and said actual solver behavior (**Black**, c 3, Equation (4)); an eighth plurality of binary values for performing a solver iteration step (**Black**, c 1, l 17-25; Fig. 3); a ninth plurality of binary values for performing a solver adaptation step (**Black**, c 1, l 17-25; Fig. 3) ; and a tenth plurality of binary values for transmitting a solution statement in a third data format (**Black**, c 1, l 17-25; Fig. 3; c 23, l 16-34).

Response to Arguments

9. The objection to the specification is withdrawn.

10. The rejection of claims 6 and 13 under 35 U.S.C. 112, first paragraph remains. Specification at page 21, lines 20-25 addresses a problem transformer module where the problem is transformed. The referenced paragraph does not address a "problem solution" transformation.

11. Applicant's arguments filed on March 9, 2004 related to Claims 1-42 have been fully considered but are not persuasive.

In reference to Applicant's argument:

The complexity module is a higher level supervising element that captures previous data on expected solver behavior as a function of problem parameters. Based on its knowledge of optimization behavior, it may alter the problem definition (perhaps by changing the number of constraints, etc.), change the optimization algorithm, or request additional system resources, such as processors, processing time, etc. The complexity module of the subject application may select among many possible solving models and various solving algorithms, whereas Black teaches only a neural network as a solver model, with the solver algorithm being only a type of gradient descent (column 1, lines 6-14).

These distinctions between the subject application and Black may be illustrated with an example application. Suppose the application is taking sensor inputs measuring the temperature of a building, considering the desired temperature goals and power limitations, and produce instructions for heating and cooling units in the building that result in the desired temperatures while meeting various limitations imposed by the actual equipment. In the approach of Black, one would generate, for a large sample of ;input conditions (sensor readings), corresponding desirable outcomes (desired temperatures and resource consumption, e.g. power). Using the input/outcomes pairs, a neural network would be constructed and the weights would be randomly assigned. Learning or optimization of the weights occurs in order to make the neural network actual outputs be as close as possible to the desired outputs. In order to design appropriate output actions for each of many inputs, a very large number of training pairs would be needed. In Black, the weights would be adjusted until no improvement was noted whereupon perhaps a new starting point for the weights would be generated or now nodes would be added and a new optimization of the weights would occur. The weights and neural network structure that gives the minimum error between desired and actual outputs of the neural network would be selected to process the sensor inputs to generate instructions for the heating and cooling units of the building.

In the subject application, rather than using a single solver, complexity models are generated that link problem characteristics- to various preferred salver configurations. Additionally, they predict the expected behavior when applying a solver configuration to a problem, which can be used to dynamically adapt the solver and to refine the complexity models if the solver's behavior diverges (specification, page 11, lines 19-23). Based on the complexity model, the desired error, and the computational constraints, the complexity model select an initial network architecture and implements a procedure to find an optimum. By comparing the expected rate of improvement to the predicted rate and the achieved rate of improvement, upon termination of the initial procedure, the complexity module would then modify the network architecture and either perform another solver iteration, go to a different model, such as constrained optimization, or change the optimization procedure. In addition, from the deviations between the expected rate of error improvement and those predicted by the complexity model, the complexity module would be updated in order to better predict complexity in the future. Unlike the teaching of Black,

the subject application might not start an optimization for a given network if the complexity module indicates that optimization would take too long or too much processing power. Instead it would transform the problem into a simpler one or request more time or initiate an error condition.

Examiner's response:

Para 3 above applies. The claims and only the claims form the metes and bounds of the invention. The referenced claim amendments constitute what is know as Markush type claims (MPEP 803.02). Simply stated, Markush type claims are characterized by a plurality of alternatively usable members. To anticipate such a claim at least one of the alternatives need be anticipated by prior art. The applicant has acknowledged that Black's prior art represents (anticipates) at least one of the applicant's alternatives. Further, and applying Para 3 above, the Examiner has full latitude to interpret each claim in the broadest reasonable sense. Under such conditions, Black anticipates the desired error and the computational constraints and selects an initial network architecture and implements a procedure to find an optimum ... such is a neural network. In essence, from the applicant's above reference response, the applicant agrees that Black anticipates the applicant's invention.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

13. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Claims 1-42 are rejected.

Correspondence Information

15. Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner, Joseph P. Hirl, whose telephone number is (703) 305-1668. The Examiner can be reached on Monday – Thursday from 6:00 a.m. to 4:30 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Anthony Knight can be reached at (703) 308-3179.

Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks,

Washington, D. C. 20231;

or faxed to:

(703) 746-7239 (for formal communications intended for entry);

or faxed to:

(703) 746-7290 (for informal or draft communications with notation of "Proposed" or "Draft" for the desk of the Examiner).

Hand-delivered responses should be brought to:

Receptionist, Crystal Park II

2121 Crystal Drive,

Arlington, Virginia.

Anthony Knight
Supervisory Patent Examiner
Group 3600

Joseph P. Hirl

April 21, 2004